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running in their feet, and other accidents. It is attended with a rigidity of the muscles of the neck, a stiffness in the limbs, and such a contraction of the jaw as to prevent their eating. It is generally fatal. In two cases I had the pleasure of seeing the disease perfectly cured by applying a potential caustic to the neck under the mane, by large doses of oil of amber, and by plunging one of them into the river, and throwing buckets of cold water upon the other.

How far the reasonings contained in this paper may apply to the hydrophobia, I cannot determine, having had no opportunity of seeing the disease since I adopted these principles; but from the spasmodic nature of the disorder, from the season of the year in which it generally occurs, and above all, from the case related by Dr. Fothergill, of a young woman having escaped the effects of the bite of a mad cat by means of the wound being kept open, (which from its severity was probably connected with some degrees of inflammation) is it not probable that the same remedies, which have been used with success in the Tetanus, may be used with advantage in the hydrophobia?—In a disease so deplorable, and hitherto so unsuccessfully treated, even a conjecture may lead to useful experiments and enquiries.

N° XXIX.

*To His Excellency BENJAMIN FRANKLIN, Esq. L. L. D.
President of the State of Pennsylvania, and of the American Philosophical Society, &c.*

SIR,

Philadelphia, January 12, 1786.

Read March
17, 1786.

THE subject of smoky chimneys, of which I had the honor of conversing with you at your own house last evening, is of so much importance to

every individual, as well as to every private family, that too much light cannot be thrown upon it.

A smoky house and a scolding wife,
Are (said to be) two of the greatest ills in life.

And however difficult it may be to remedy one of those ills, yet any advances we may be able to make towards removing the inconveniencies arising from the other, cannot fail to be favourably received by the public. As they are shortly to be favoured with your sentiments on that subject, possibly the following observations, which were in fact occasioned by necessity, and are the result of my own experience, may not be altogether undeserving of notice.

When I left London and went to live in Devonshire in the latter end of the year 1777, it happened to be my lot to dwell in an old mansion which had been recently modernised, and had undergone a thorough repair. But as in most of the old houses in England, the chimneys, which were perhaps originally built for the purpose of burning wood, though they had been contracted in front, since coal fires came into general use, to the modern size, yet they were still, above, out of sight, extravagantly large. This method of building chimneys may perhaps have answered well enough while it was the custom to sit with the doors and windows open; but when the customs and manners of the people began to be more polished and refined, when building and architecture were improved, and they began to conceive the idea of making their chambers close, warm, and comfortable, these chimneys were found to smoke abominably, for want of a sufficient supply of air. This was exactly the case with the house in which I first lived, near Exeter, and I was under the necessity of trying every expedient I could think of to make it habitable.

The first thing I tried, was that method of contracting the chimneys by means of earthen pots, much in use in
England,

England, which are made on purpose, and which are put upon the tops of them ; but this method by no means answered. I then thought of contracting them below, but as the method of contracting them in front to the size of a small coal-fire grate has an unsightly appearance, as it makes a disagreeable blowing like a furnace, and as it is the occasion of consuming a great deal of unnecessary fuel, the heat of which is immediately hurried up the chimney, I rejected this method, and determined to contract them above, a little out of sight. For this purpose I threw an arch across, and also drew them in at the sides. This had some effect, but as this contraction was made rather suddenly, and the smoke, by striking against the corners that were thereby occasioned, was apt to recoil, by which means some part of it was thrown out into the room ; I determined to make the contraction more gradually, and therefore run it up at the back, where the depth of the chimney would admit of it, and also shelving or sloping in a conical kind of direction at the sides, as high as a man, standing upright, could conveniently reach, and by this means brought the cavity within the space of about twelve by fourteen or sixteen inches, which I found sufficiently large to admit a boy to go up and down to sweep the chimnies. This method I found to succeed perfectly well, as to curing the chimneys of smoking, and it had this good effect of making the rooms considerably warmer ; and as this experiment succeeded so well, since the only use of a chimney is to convey away the smoke, I determined to carry it still farther, in order to ascertain with precision, how much space is absolutely necessary for that purpose, because all the rest that is shut up, must be so much gained in warmth. Accordingly I laid a piece of slate across the remaining aperture, removable at pleasure, so as to contract the space above two thirds, leaving about three inches by twelve remaining open ; but this space, except when the fire burnt remarkably clear, was scarcely

scarcely sufficient to carry away the smoke. I therefore enlarged it to half the space, that is, to about six by seven or eight inches, which I found fully sufficient to carry away the smoke from the largest fires.

When I removed into the Bedford Circus in Exeter, though the house was modern, and almost perfectly new, yet the chimneys were large ; in consequence of which almost every room of it smoked. My predecessor, who was the first inhabitant, had been at great expence in patent stoves, &c. but without effect ; but by adopting the method I have just now described, I not only cured every chimney of smoking, but my house was remarked for being one of the warmest and most comfortable to live in of any in that large and opulent city.

The house I now live in, in Philadelphia, I am told, has always had the character of being both cold and smoky ; and I was convinced, as soon as I saw the rooms and examined the chimneys, that it deserved that character ; for though the rooms were close, the chimneys were large : And we shall ever find, that if our chimneys are large, our rooms will be cold even though they should be tolerably close and tight ; because the constant rushing in of the cold air at the cracks and crevices, and also at every opening of the door will be sufficient to chill the air, as fast as it is heated, or to force the heated air up the chimney ; but by contracting the chimneys I have cured it of both these defects. There was one remarkable circumstance attending the contraction of the chimney in the front parlour, which deserves to be attended to ; which was, that before I applied the cast iron plate, which I made use of instead of slate, to diminish the space requisite for a chimney sweeper's boy to go up and down, the suction or draught of air was so great, that it was with difficulty I could shut the door of the room, insomuch that I at first thought it was owing to a tightness of the hinges, which I imagined must be remedied, but upon applying
the

the iron plate, by which the space was diminished one half, the door shut to with the greatest ease. This extraordinary pressure of the air upon the door of the room, or suction of the chimney, I take to be owing in some measure to the unusual height of the house.

Upon the whole, therefore, this fact seems clearly ascertained, viz. That the flue or size of the chimney, ought always to be proportioned to the tightness and closeness of the room, some air is undoubtedly necessary to be admitted into the room in order to carry up the smoke, otherwise as you justly observed we might as well expect smoke to arise out of an exhausted receiver; but if the flue is very large, and the room is tight, either the smoke will not ascend, in consequence of which will be, that the air of your room will be so frequently and so constantly changed that as fast as it is heated, it will be hurried away, with the smoke, up the chimney, and of course your room will be constantly cold.

One great advantage attending this method of curing smoky chimneys is, that, in the first place, it makes no awkward or unsightly appearance, nothing being to be seen but what is usual to chimneys in common; and in the second place that it is attended with very little expence, a few bricks and mortar with a plate or covering to the aperture, and a little labour, being all that is requisite. But in this new country where crops of houses may be expected to rise almost as quick as fields of corn, when the principles upon which chimneys ought to be thoroughly understood, it is to be hoped, that not only this expence, small as it is, but that all the other inconveniencies we have been speaking of, will be avoided, by constructing the flues of the chimneys sufficiently small.

From your humble servant,

THOMAS RUSTON.